

REMARKS

Reconsideration and allowance of the present application based on the following remarks are respectfully requested. Claims 2-4, 7, 11-13, 15, 21, 23-25, 27 and 29-46 are pending in the present Application. Claim 14 has been canceled without prejudice or disclaimer.

Applicants are appreciative of the courtesies extended by the Examiner to Applicants' representatives during the personal interview of September 9, 2003. The Examiner indicated that Figure 22A showed considerable structural differences with the prior art and proposed an amendment to claim 2 that would put claim 2 in form for allowance. The Examiner indicated that if claim 2 is amended to recite "a labyrinth heat transfer space formed by complementary concentric or spiral grooves provided on opposite surfaces of said electrode unit and said cooling block," this language would distinguish claim 2 over the cited references.

Accordingly, Applicants have amended claim 2 to recite, *inter-alia*, "a labyrinth heat transfer space formed by complementary concentric or spiral grooves provided on opposite surfaces of said electrode unit and said cooling block."

Consequently, Applicants respectfully submit that claim 2 and dependent claims are in form for allowance.

Claim Rejections – 35 U.S.C. § 103

Claims 2, 14, 25, 29, 30, 31, 37, 40, 41 and 46 are rejected under 35 U.S.C. 103(a) as being unpatentable over Heimanson *et al.* (US Pat. No. 5,775,416) in view of Gilchrist *et al.* (US Pat. No. 5,846,375).

Claims 2, 37, 40 have been amended to recite, *inter-alia*, "a labyrinth heat transfer space formed by complementary concentric or spiral grooves provided on opposite surfaces of said electrode unit and said cooling block." Claim 25 has been amended to recite, *inter-alia*, "a labyrinth heat transfer space formed by complementary concentric or spiral grooves provided on opposite surfaces of said placement table and said cooling block." Applicants submit that amendments to claims 2, 25, 37 and 40 obviate the above rejection.

Claim 46 has been amended to recite, *inter-alia*, "a labyrinth heat transfer space formed of a plurality of grooves provided on two adjoining surfaces."

Heimanson *et al.* merely describes "a second cavity 50" formed by the O-ring seal 44 and annular seat 46, together with the respective bodies 26 and 36 of the heating and cooling units 24 and 34 (see, Figure 1 and col. 3, lines 50-52 in Heimanson *et al.*). The second cavity

50 in Heimanson *et al.* is a simple space and does not form a labyrinth heat transfer space as recited in the claims. Consequently, Heimanson *et al.* does not disclose, teach or suggest "a labyrinth heat transfer space formed by complementary concentric or spiral grooves provided on opposite surfaces of said electrode unit and said cooling block," as recited in claims 2, 37 and 40 or "a labyrinth heat transfer space formed by complementary concentric or spiral grooves provided on opposite surfaces of said placement table and said cooling block," as recited in claim 25. Similarly, Heimanson does not disclose, teach or suggest "a labyrinth heat transfer space formed of a plurality of grooves provided on two adjoining surfaces," as recited in claim 46.

With regard to Gilchrist *et al.*, this reference merely describes an electrode 14 having a cooling system imbedded in the body 15 of bottom electrode 14. The cooling system of Gilchrist *et al.* is comprised of conduits 32a, 32b, 32c and 32d which are embedded in the body 15 of electrode 14 and a coolant, typically water, flows into each conduit 32a-32d (see, col. 4 lines 26-29). Furthermore, the conduits of Gilchrist *et al.* do not form complementary spiral or concentric grooves provides on two opposite surfaces.

Accordingly, Gilchrist *et al.* does not disclose or suggest a labyrinth heat transfer space formed by complementary concentric or spiral grooves provided on opposite surfaces of the electrode unit and the cooling block as recited in claims 2, 37 and 40 or provided on opposite surfaces of the placement table and the cooling block as recited in claim 25. Similarly, Gilchrist *et al.* does not disclose, teach or suggest "a labyrinth heat transfer space formed of a plurality of grooves provided on two adjoining surfaces," as recited in claim 46.

Furthermore, there is no suggestion in the prior art for making such structure with the claimed combination of elements and even if one were to replace Heimanson *et al.* cavity 50 "heat transfer space" with Gilchrist *et al.* conduits 32a, 32b, 32c and 32 "labyrinth heat transfer space", which the Applicant does not concede, one would not obtain the labyrinth heat transfer space formed by complementary concentric or spiral grooves provided on opposite surfaces of the electrode unit and the cooling block as recited in claims 2, 37 and 40 or provided on opposite surfaces of the placement table and the cooling block as recited in claim 25.

Consequently, for at least above reasons, neither Heimanson *et al.* nor Gilchrist *et al.* disclose, teach or suggest, alone or in combination, the subject matter recited in claims 2, 25, 37, 40 and 46.

Claim 14 has been canceled without prejudice or disclaimer. Therefore, the rejection of claim 14 is rendered moot.

Therefore, Applicants respectfully submit that claims 2, 25, 37, 40 and 46, and claims 29-31, and 41 which are dependent therefrom, are patentable and respectfully request that the § 103(a) rejection of claims 2, 14, 25, 29-31, 37, 40, 41 and 46 be withdrawn.

Claims 3 and 4 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Heimanson *et al.* and Gilchrist, *et al.* in view of McMillin *et al.* (US Pat. No. 5,835,334).

Claims 3 and 4 are directly or indirectly dependent from claim 2. Therefore, for at least the reasons presented above for claim 2, Applicants submit that claims 3 and 4 are patentable over Heimanson *et al.* and Gilchrist *et al.*

McMillin *et al.* fails to overcome the above noted deficiencies of Heimanson *et al.* and Gilchrist *et al.*. Therefore, Applicants respectfully request submit that none of the prior art references, Heimanson *et al.*, Gilchrist *et al.* and McMillin *et al.* disclose, teach or suggest, alone or in combination, the subject matter recited in claims 3 and 4 and respectfully request that the rejection of claims 3 and 4 under § 103(a) be withdrawn.

Claims 7 and 27 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Heimanson *et al.* and Gilchrist *et al.* in view of Shamouilian *et al.* (US Pat. No. 5,745,331).

Claims 7 and 27 are dependent from claims 2 and 25, respectively. Therefore, for at least the reasons presented above for claims 2 and 25, Applicants submit that claims 7 and 27 are patentable over Heimanson *et al.* and Gilchrist *et al.*

Shamouilian *et al.* fails to overcome the above noted deficiencies of Heimanson *et al.* and Gilchrist *et al.*. Therefore, Applicants respectfully request submit that none of the prior art references, Heimanson *et al.*, Gilchrist *et al.* and Shamouilian *et al.* disclose, teach or suggest, alone or in combination, the subject matter recited in claims 7 and 27 and respectfully request that the rejection of claims 7 and 27 under § 103(a) be withdrawn.

Claims 11, 12, 23 and 24 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Heimanson *et al.* in view of Sherman (US Pat. No. 5,535,090) and Mori *et al.* (US Pat. No. 5,935,460). Applicants respectfully traverse this rejection for at least the following reasons.

As conceded in the Office Action Heimanson *et al.* is silent about "a heat resistant metal seal member for sealing an electrode-side heat transfer space formed between said electrode unit and said cooling block" as recited in claim 11 or claim 23.

The Office Action contends Sherman teaches an electrostatic chuck with seal members 28 that can be metallic. Applicants respectfully disagree.

Sherman merely teaches that the seal member 28 seals the reactor wall 29 to the metal plate 4 of the chuck metal base 12. The seal member 28 of Sherman may be metallic. However, the seal member 28 of Sherman is used for simply sealing the reactor wall 29 and the metal plate 4, which is different from using the seal member 28 to seal an electrode side heat transfer space. Thus, one would not be motivated to combine Sherman with Heimanson *et al.*

Moreover, even if one were to replace the seal 44 of Heimanson *et al.* by the seal member 28 of Sherman, which Applicants do not concede, one would not obtain a heat resistant metal seal member for sealing an electrode-side heat transfer space formed between the electrode unit and the cooling block, as recited in claims 11 and 23 because Heimanson *et al.* merely uses seal 44 to seal between plate 36a and annular clamp 48 not between an electrode side and a heat transfer space.

Mori *et al.* merely teaches a nickel fluoride insulator coating. Moreover, there is no suggestion in the prior art for making such structure with the claimed combination of elements disclosed in the prior art. Consequently, none of Heimanson *et al.*, Sherman and Mori *et al.* disclose, teach or suggest, alone or in combination, the subject matter recited in claim 11 or claim 23.

Therefore, for at least the above reasons, Applicants respectfully submit that claims 11 and 23, and claims 12 and 24 which are dependent from claims 11 and 24, respectively, are patentable and respectfully request that the rejection of claims 11, 12, 23 and 24 under § 103(a) be withdrawn.

Claim 21 is rejected under 35 U.S.C. § 103(a) as being unpatentable over Heimanson *et al.* in view of Sherman and Mori *et al.* Applicants respectfully traverse this rejection for at least the following reasons.

As conceded in the Office Action Heimanson *et al.* is silent about "a heat resistant metal seal member for sealing an electrode-side heat transfer space formed between said electrode unit and said cooling block" and Heimanson *et al.* is silent about "said heat resistant metal seal member is covered by a soft metal film of a material having a softening point lower than a process temperature of said object to be processed," as recited in claim 21.

The Office Action contends Sherman teaches an electrostatic chuck with seal members 28 that can be metallic and contends that it would have been obvious to replace the organic seal member 44 of Heimanson *et al.* with a nickel fluoride protected metallic seal member as taught by Sherman and Mori. Applicants respectfully disagree.

For at least the reasons presented above with regard to claim 11, Applicants respectfully submit that none of Heimanson *et al.*, Sherman and Mori *et al.* disclose, teach or suggest, alone or in combination, the subject matter recited in claim 21.

Therefore, for at least the above reasons, Applicants respectfully submit that claim 21 is patentable and respectfully request that the rejection of claim 21 under § 103(a) be withdrawn.

Claim 13 is rejected under 35 U.S.C. § 103(a) as being unpatentable over Heimanson *et al.* and Gilchrist *et al.* in view of Niori *et al.* (US Pat. No. 5,800,618).

Claim 13 is dependent from claim 2 and for at least the reasons presented above with regard to claim 2, Applicants submit that claim 13 is patentable over Heimanson *et al.* and Gilchrist *et al.*

Niori *et al.* fails to overcome the above noted deficiencies in Heimanson *et al.* and Gilchrist *et al.* Therefore, Applicants respectfully request submit that none of the prior at references, Heimanson *et al.*, Gilchrist *et al.* and Niori *et al.* disclose, teach or suggest, alone or in combination, the subject matter recited in claim 13 and respectfully request that the rejection of claim 13 under § 103(a) be withdrawn.

Claim 15 is rejected under 35 U.S.C. § 103(a) as being unpatentable over Heimanson *et al.* and Gilchrist *et al.* in view of Ishii (US Pat. No. 5,529,657).

Claim 15 is dependent from claim 2 and for at least the reasons presented above with regard to claim 2, Applicants submit that claim 15 is patentable over Heimanson *et al.* and Gilchrist *et al.*

Ishii fails to overcome the above noted deficiencies in Heimanson *et al.* and Gilchrist *et al.* Therefore, Applicants respectfully request submit that none of the prior at references, Heimanson *et al.*, Gilchrist *et al.* and Ishii disclose, teach or suggest, alone or in combination, the subject matter recited in claim 15 and Applicants respectfully request that the rejection of claim 15 under § 103(a) be withdrawn.

Claim 32 is rejected under 35 U.S.C. § 103(a) as being unpatentable over Heimanson *et al.* in view of Sherman, McMillin *et al.* and Gilchrist *et al.* Applicants respectfully traverse this rejection for at least the following reasons.

As conceded in the Office Action, Heimanson *et al.* does not teach seal members are metallic and does not teach the stainless steel member in Heimanson *et al.* as being made of an electrically insulating material with a coefficient of thermal conductivity of 80 W/mk. Furthermore, as conceded in the Office Action, Heimanson *et al.* does not teach an insulating member divides the heat transfer space into an upper and a lower space. Moreover, Heimanson *et al.* is silent about "an electrode unit having a heater unit therein." The heater unit 24 in Heimanson *et al.* merely heats wafer 18 and Heimanson *et al.* does not provide the chuck 20 with an electrical connection, i.e. there is no electrode unit in the chuck of Heimanson *et al.* Moreover, Heimanson *et al.* does not suggest anywhere that the chuck unit can be provided with an electrical power.

With regard to Sherman, this reference merely teaches an electrostatic chuck but fails to teach or suggest the additional elements recited in claim 32. Specifically, Sherman does not teach, disclose or suggest an insulating member that divides a heat transfer space into an upper and a lower space.

Furthermore, even if one were to combine Sherman or Gilchrist *et al.* with Heimanson and provide an electrically biased chuck, which Applicants do not concede, one would have to drastically alter the structure of the temperature controlled chuck of Heimanson *et al.* such as insulation to avoid a short circuit in the chuck assembly as Heimanson *et al.*'s chuck employs water as a coolant and various metallic parts. Thus, one of ordinary skill in the art would not be motivated to modify the chuck structure of Heimanson *et al.*

The Office Action contends that McMillin teaches an electrically insulating material being aluminum nitride as a component of the chuck and thus it would have been obvious to one of ordinary skill in the art to replace Heimanson's organic seal member 44 with a metallic seal member as taught by Sherman and to use aluminum nitride material instead of Heimanson's stainless steel for an insulating material as taught by McMillin and it would have been obvious to one of ordinary skill in the art to provide additional o-ring seals between the cooling block and the aluminum nitride insulating member such that the insulating member divides the heat transfer space into an upper and a lower space. Applicants respectfully disagree.

Adding o-ring seals into Heimanson's o-ring seal 44 between the cooling block 34 and member 48 and the steel plate member 36 would not divide the cavity 50 (referred to in the

Office Action as "heat transfer space") into two spaces. Moreover, there is no suggestion in the prior art for making such electrode structure with the claimed combination of elements disclosed in the prior art.

Therefore, Applicants respectfully submit that none of the prior art references, Heismanson *et al.*, Sherman, Gilchrist *et al.* and McMillin disclose, teach or suggest, alone or in combination, the subject matter recited in claim 32 and respectfully request that the rejection of claim 32 under § 103(a) be withdrawn.

Claim 33 is rejected under 35 U.S.C. § 103(a) as being unpatentable over Heismanson *et al.* in view of Gilchrist *et al.*, and McMillin *et al.* Applicants respectfully traverse this rejection for at least the following reasons.

As conceded in the Office Action, Heismanson *et al.* does not teach seal members are metallic and does not teach the stainless steel member in Heismanson *et al.* as being made of an electrically insulating material with a coefficient of thermal conductivity of 80 W/mk. Furthermore, as conceded in the Office Action, Heismanson *et al.* and Gilchrist do not teach an insulating member divides the heat transfer space into an upper and a lower space. Furthermore, as stated above, Heismanson *et al.* is silent about "an electrode unit having a heater unit therein."

In addition, for at least the reasons provided above with regard to claim 2, Applicants respectfully submit that none of the prior art references, Heismanson *et al.*, Gilchrist *et al.* disclose, teach or suggest, alone or in combination, a labyrinth heat transfer space formed by complementary concentric or spiral grooves provided on opposite surfaces of the electrode unit and the cooling block, as recited in claim 33. McMillin *et al.* fails to overcome the above noted deficiencies of Heismanson *et al.*, Gilchrist *et al.* Thus, it is respectfully requested that the rejection of claim 33 under § 103(a) be withdrawn.

Claim 34 is rejected under 35 U.S.C. § 103(a) as being unpatentable over Heismanson *et al.* in view of Sherman and Husain *et al.* (US Pat. No. 5,548,470). Applicants respectfully traverse this rejection for at least the following reasons.

As conceded in the Office Action, Heismanson *et al.* does not teach a contact rate between interfacing surfaces of the structures.

Moreover, as stated above, Heismanson does not teach or suggest an electrode unit having a heater unit therein and Heismanson does not teach or suggest a heat resistant metal seal member for sealing an electrode-side heat transfer space formed between the electrode

unit and the cooling block. Specifically, in Heimanson, the seal 44 is merely disposed to seal plate 36a to member 48. Moreover, for at least the reasons provided above with regard to claim 32, neither Heimanson *et al.* nor Sherman, alone or in combination, disclose or suggest an electrode unit having a heater unit therein. Husain *et al.* fails to overcome the deficiencies noted in Heimanson *et al.* and Sherman. Therefore, Applicants respectfully request submit that none of the prior art references, Heimanson *et al.*, Sherman and Husain *et al.* disclose, teach or suggest, alone or in combination, the subject matter recited in claim 34 and respectfully request that the rejection of claim 34 under § 103(a) be withdrawn.

Claims 35 and 44 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Heimanson *et al.* and Gilchrist *et al.* in view of Husain *et al.* Applicants respectfully traverse this rejection for at least the following reasons.

As conceded in the Office Action, Heimanson *et al.* and Gilchrist do not teach a contact rate between interfacing surfaces of the structures.

Moreover, as stated above, Heimanson does not teach or suggest an electrode unit having a heater unit therein. Furthermore, for at least the reasons provided above with respect to claim 32, Applicants respectfully submit that none of the prior art references, Heimanson *et al.*, Gilchrist *et al.* and Husain *et al.* disclose, teach or suggest, alone or in combination, the subject matter recited in claims 35. Furthermore, none of the references disclose, teach or even suggest a labyrinth heat transfer space formed by complementary concentric or spiral grooves provided on opposite surfaces of the electrode unit and the cooling block, as recited in claims 35 or a labyrinth heat transfer space formed by complementary concentric or spiral grooves provided on opposite surfaces of the placement table and the cooling block, as recited in claim 44. Husain *et al.* fails to overcome the deficiencies of Heimanson *et al.* and Gilchrist *et al.*

Therefore, Applicants respectfully submit that claims 35 and 44 are patentable and respectfully request that the rejection of claims 35 and 44 under § 103(a) be withdrawn.

Claims 36 and 38 is rejected under 35 U.S.C. § 103(a) as being unpatentable over Heimanson *et al.* in view of Sherman. Applicants respectfully traverse this rejection for at least the following reasons.

For at least the reasons provided above with regard to claim 32 neither Heimanson *et al.* nor Sherman, disclose, teach or suggest an electrode unit having a heater unit therein as recited in claims 36 and 38.

Therefore, Applicants respectfully submit that claims 36 and 38 are patentable and respectfully request that the rejection of claims 36 and 38 under § 103(a) be withdrawn.

Claim 39 is rejected under 35 U.S.C. § 103(a) as being unpatentable over Heimanson *et al.* and Gilchrist *et al.* in view of Sherman. Applicants respectfully traverse this rejection for at least the following reasons.

As conceded in the Office Action, Heimanson *et al.* and Gilchrist *et al.* do not teach a metallic seal member.

Moreover, Applicants submit that claim 39 is dependent from claim 38. Therefore, for at least the above reasons presented for claim 38, Applicants respectfully submit that claim 39 is patentable respectfully request that the rejection of claim 39 under § 103(a) be withdrawn.

Claim 42 is rejected under 35 U.S.C. § 103(a) as being unpatentable over Heimanson *et al.*, Sherman, and Gilchrist *et al.* in view of Lei *et al.* (US Pat. No. 5,556,476). Applicants respectfully traverse this rejection for at least the following reasons.

As conceded in the Office Action, Heimanson *et al.*, Sherman, and Gilchrist *et al.* do not teach a gas blower to provide a release of heat. Moreover, as stated above, Heimanson does not disclose or suggest an electrode unit having a heater unit therein and Heimanson *et al.* does not disclose or suggest a heat resistant metal seal member for sealing an electrode-side heat transfer space formed between the electrode unit and the cooling block.

Furthermore, for at least the reasons provided above with regard to claim 32, none of Heimanson *et al.*, Gilchrist *et al.* or Sherman disclose or suggest, alone or in combination, “an electrode unit having a heater unit therein”

Lei *et al.* fails to overcome the deficiencies noted above with regard to Heimanson *et al.*, Sherman and Gilchrist. In addition, Lei *et al.* does not promote release of heat by blowing a gas toward a back surface of an electrode unit.

Therefore, Applicants respectfully submit that none of the prior art references, Heimanson *et al.*, Sherman, Gilchrist *et al.* and Lei *et al.* disclose, teach or suggest, alone or in combination, the subject matter recited in claim 42 and Applicants respectfully request that the rejection of claim 42 under § 103(a) be withdrawn.

Claims 43 and 45 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Heimanson *et al.* and Gilchrist *et al.* in view of Lei *et al.* Applicants respectfully traverse this rejection for at least the following reasons.

As conceded in the Office Action, Heimanson *et al.* and Gilchrist *et al.* do not teach a gas blower to provide a release of heat. Moreover, as stated above, Heimanson does not disclose or suggest an electrode unit having a heater unit therein and Heimanson *et al.* does not disclose or suggest a heat resistant metal seal member for sealing an electrode-side heat transfer space formed between the electrode unit and the cooling block. Specifically, in Heimanson, the seal 44 is merely disposed to seal plate 36b to member 48. Furthermore, none of the prior art references Heimanson *et al.*, Gilchrist *et al.* and Lei *et al.* disclose or suggest "the center of the electrode unit is held by a hollow column, and a gas blower is provided in the column for promoting release of heat by blowing a gas toward the center of a back surface of the electrode unit." Furthermore none of the prior art references Heimanson *et al.*, Gilchrist *et al.* and Lei *et al.* disclose, teach or suggest "an electrode unit having a heater unit therein," or "a labyrinth heat transfer space formed by complementary concentric or spiral grooves provided on opposite surfaces of said electrode unit and said cooling block," as recited in claim 43 or "a labyrinth heat transfer space formed by complementary concentric or spiral grooves provided on opposite surfaces of said placement table and said cooling block," as recited in claim 45.

Furthermore, none of the cited references, disclose, teach or suggest, alone or in combination a labyrinth heat transfer space formed by complementary concentric or spiral grooves provided on opposite surfaces of the electrode unit and the cooling block.

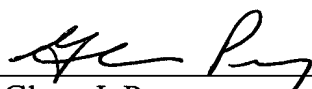
Therefore, Applicants respectfully submit that none of the prior art references, Heimanson *et al.*, Sherman, Gilchrist *et al.* and Lei *et al.* disclose, teach or suggest, alone or in combination, the subject matter recited in claims 43 and 45. Thus, Applicants respectfully request that the rejection of claims 43 and 45 under § 103(a) be withdrawn.

CONCLUSION

In view of the foregoing, the claims are now in form for allowance, and such action is hereby solicited. If any point remains in issue which the Examiner feels may be best resolved through a personal or telephone interview, he is kindly requested to contact the undersigned at the telephone number listed below.

All objections and rejections having been addressed, it is respectfully submitted that the present application is in a condition for allowance and a Notice to that effect is earnestly solicited.

Respectfully submitted,
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